



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
JULY 8, 1996, 1:30 P.M.
DESIGN WEST CONFERENCE ROOM**

Present:	T. A. Coleman	C. Roberts	L. R. Brown
	J. D. Culp	C. T. Maki	P. A. Lynwood (P. F. Miller)
	J. W. Reincke	S. Bower (W. C. Turner)	E. D. Winkler
	C. J. Arnold	G. J. Kavalaris	T. Fort

OLD BUSINESS

1. Approval of the Minutes of the June 7, 1996, Meeting -T. A. Coleman

Minutes of the June 7, 1996, meeting were approved with revisions regarding the Action Statement for the following item:

OLD BUSINESS: Item 3, "Final Report (Executive Summary), Safety Issues and Operational Treatments for Tight Diamond Ramps With Intersection Sight Distance Problem"

ACTION (As Written): The committee approved Item A, with the stipulation that revision will be incorporated as discussed, and Item B and Item C disapproved.

ACTION (Revised): The committee approved Item A with the stipulation that revision will be incorporated as discussed and Item B. Item C was disapproved.

2. Warranties: Bituminous Construction Projects or Concrete - P. F. Miller

This item is a follow-up to the June 7, 1996, meeting as follows: The Design Division, specifically the US-23 Project Group chaired by Bil Turner, is charged to review on-going activities and provide recommendations by January 1, 1997, for a different approach to implement warrant contracts. The Construction Division (Paul Miller) is charged to explore and present a plan to possibly engage consultants for construction management services for the 1997 construction season if funding levels increase and staff remains short. A progress report is requested at each EOC meeting.

A status of activities to address contract warranties were presented by the Design and Construction Divisions. Both divisions will continue their efforts to develop a strategy and plan, which will facilitate the accomplishment of the department's annual program utilizing warranty contracts for design and construction management services, as required.

3. Rumble Strip Preservation (See Minutes of June 7, 1996, New Business Item 2) - J. D. Culp

This agenda item was tabled for a future meeting.

4. Galvanized Guardrail - C. Roberts

Background Information: Industry is requesting MDOT's reconsideration for the use of pre-galvanized guardrail beam to be used in addition to the post galvanized product currently specified. Internal reviews revealed that the Traffic and Safety, and Maintenance Divisions are opposed to modification to existing specifications based on their past experience. As a follow-up to the June 7, 1996, meeting the Materials and Technology Division was requested to conduct a technical review of documentation presented on pre/post rolled galvanized material.

A technical review of the documentation findings and recommendations includes the following:

Product information provided by the manufacturer was evaluated by the Materials and Technology Division's Structural Services Unit, with input from the Structural Research Corrosion and Mechanics Specialist. A recommendation was made to the New Materials Committee in June 1995 to approve pregalvanized steel beam guardrail for use on MDOT projects. In response to objections from Traffic and Safety regarding the possibility of excessive corrosion at the guardrail connections, a further recommendation was made to select small projects on which to install the pregalvanized guardrail for field evaluation.

The pregalvanized guardrail submitted by Gregory Highway Products is manufactured by first applying a Type II zinc coating (3.60 oz/ft²) to Class A base metal (0.105 in.) cut to width and then fabricating the coated steel to the required dimensions. The resulting sheared ends and punched bolt holes do not receive a zinc coating as they do when prefabricated guardrail beam is galvanized. Both processes are allowed by AASHTO M180, which is the underlying specification cited by current MDOT Standard Specifications for Construction. The material evaluation focused on the long term structural and cosmetic effect of these uncoated edges in Michigan's corrosive roadside environment.

The Structural Services Unit concluded that the uncoated steel edges represent a small portion of the beam element, and that the sacrificial protection provided by the zinc coating will bridge these minor gaps. Therefore, the uncoated areas resulting from fabrication after galvanizing would not result in reduced function of the guardrail. The Materials and Technology Division concludes that the product evaluation and recommendation for use still stands.

ACTION: EOC approved the limited use of pregalvanized guardrail on a pilot basis with the stipulation to contact other state DOTs to gain insight of their experience, identify test sites and conduct field evaluations this construction season.

The Maintenance Division is charged to take the lead on this, with assistance provided by the Materials and Technology Division.

5. **Light Emitting Diode Lights (LED) - J. W. Reincke**

Background Information: The Traffic and Safety Division proposed that the LED device be allowed as an alternate to the incandescent light only on new projects where hi-intensity sheeting is also required on Type II barricades. LED lights and hi-intensity sheeting are a systems approach to construction zone delineation.

The EOC agreed with this recommendation and the devices will be used on selected projects under a variety of conditions - urban, rural, and in-between. The Construction and Traffic and Safety Divisions will take the lead in preparing the necessary documents to accomplish this, including evaluation criteria as well as the physical and environmental factors that will be used to evaluate LED light performance. The evaluations will be conducted by project personnel, and the Construction Zone Review Team will also conduct separate evaluations under a variety of conditions.

The Construction Division will update the EOC as necessary, and will formally report on the evaluation of LEDs following the 1996 construction season.

Update on Field Evaluations: The 1996 field reviews and evaluations of LEDs on construction zone barrels continue to show excellent performance and reliability. When evaluated side by side with incandescent lights, LEDs are more often preferred. The performance of the second generation LEDs has been equal to or better than the traditional incandescent.

The Materials and Technology Division concurs with the Construction Zone Advisory Committee's memo of July 2, 1996 (attached), and request the EOC to: 1) Amend previous action from the March 1996 EOC meeting to allow expanded use of this technology, and 2) Approve the recommendation to expand the potential for LED use by allowing resident engineers the authority and control over their use on all projects. Review and evaluation by project personnel and the construction zone review team should continue.

ACTION: The proposed recommendation for expanded use of LED light and solar-assist arrow boards was approved, as presented. The Construction and Materials and Technology Divisions were charged to prepare and distribute a joint memo of instruction on the use and application of LEDs on MDOT projects.

6. **Guardrail Endings - J. D. Culp**

Background Information: Cost for the installation of guardrail endings on projects completed are excessive in comparison to previous installation costs. Due to the availability of a limited number of suppliers capable of providing these endings, concerns were expressed that there is an issue of sole proprietary of the product.

The Traffic and Safety Division was charged to take this issue back to the Barrier Advisory Committee for review and present a report to the committee recommending a competitive product as soon as possible.

The following report was provided to address and clarify issues presented:

Cost - Since the FHWA's ban of the use of the BCT began this year, the costs for an ending chosen could be "excessive in comparison to previous installation cost". In these first six months of using the SRT-350, the unit cost for these endings have averaged about \$1,800 to \$1,900 each. The BCT ending that has been used for more than 15 years was between \$900 and \$1,000. The difference is considerable, but the BCT is no longer an allowable option. A "comparison to previous installations" is not useful.

MELT - The MELT (Modified Eccentric Loader Terminal) is a nonproprietary ending developed by the FHWA. We do not have installation or cost experience with this

system, since we have not used it. The cost might be less than the SRT, but it is undoubtedly more than the BCT due to the design changes. MELT is an evolved version of the BCT. Our past research of the cost showed the material cost for the SRT is comparable to the MELT. Approximately \$850 for the SRT vs \$725 for the MELT. The cost of both systems has increased since then (estimated \$150 more) due to design changes. Any additional disparity seems to be installer's mark up for labor and profit.

NCHRP 230 vs NCHRP 350 - The primary reason the BCT has been banned by the FHWA, is that it did not pass NCHRP 230 crash test criteria for small cars; the MELT did meet NCHRP 230. NCHRP 230 has been replaced by new criteria; NCHRP 350. Since no ending had passed NCHRP 350 at the time the mandate was made, FHWA allowed states to choose replacements for the BCT that at least passed the old NCHRP 230 requirements. However, they also mandated that by August of 1998 all barriers must meet the new NCHRP 350 requirements. The MELT has since been tested under NCHRP 350 criteria, and has not passed the total crash testing at this time.

We are told by FHWA sources that a meeting will be held in FHWA Washington Office this month (July) to discuss the future of the MELT. They are to discuss whether or not to continue pursuing their attempts to get the MELT to pass NCHRP 350.

Although we are allowed to use NCHRP 230 approved endings, such as the MELT, we feel in the near future (1998) it could prove to be a costly gamble. Why take a step backward?

SRT - MDOT has preferred the adoption of "gating" terminals. The SRT is the only gating terminal that has passed NCHRP 350. In FHWA's approval of the SRT, they commented that the SRT is a "significant improvement over the Eccentric Loader BCT and the MELT". Gating terminals rely on the dynamic buckling of the rail for energy dissipation and controlled penetration. The buckling strength of the SRT is only one percent of the strength rail used in the MELT.

Proprietary Endings - It was not MDOT's preference to choose a proprietary ending. FHWA granted MDOT approval of the SRT as a standard on the basis that there was not equal alternative. Federal regulations normally require proprietary items to be competitively bid with equal non-proprietary items. We still feel there is no equal alternative. We agreed to re-evaluate our choices when other gating terminals have at least passed NCHRP 350.

Maintaining Two Endings - If we were to allow the MELT as an alternative to the SRT, Maintenance forces will need to stock parts for both endings. The parts are not interchangeable between the two options. The Maintenance crew must become familiar with the installation of both endings.

ACTION: MDOT/FHWA will keep current on issues and will move forward to insure a more competitive industry by having a number of suppliers capable of providing these approved crash tested competitive guardrail endings as soon as possible.

NEW BUSINESS

1. **Silica Fume Modified Concrete as an Overlay for Bridge Decks - J. W. Reincke**

Bridges in Michigan are exposed to heavy applications of deicing salts and many are in a condition such that the decks are in need of repair. Since the early 1970s, MDOT has specified latex modified concrete as the standard concrete overlay material for bridge decks. During the 1980s, MDOT initiated research into silica fume modified concrete as an economical alternative to latex modified concrete.

The Materials Research Group, in the Materials and Technology Division, established Research Project 85 B-102 to investigate the silica fume modified concrete as an overlay material. Upon completion of this project, the group concluded that progress was favorable and established Research Project B-106 to build upon the findings.

MDOT has developed a Special Provision for Silica Fume Modified Concrete. It has been found to possess the engineering properties of a suitable overlay material. Silica fume modified concrete is highly impermeable, develops the necessary bond to the underlying concrete, and exceeds the specification requirements for compressive and flexural strength.

The Materials Research Group recommends the Standard Specification be modified to allow the contractor the option between silica fume modified concrete and latex modified concrete for use as an overlay material for bridge decks. This recommendation is made with the concurrence of technical staff of the Design and Construction Divisions.

ACTION: EOC approved, as presented.

2. **Pavement Selection - Reconstruction Project: C.S. 82194, J.N. 36005, I-75 From Fort Street to Grand Boulevard, 3.86 km (2.4 mi), Metro District - W. C. Turner/S. Bower**

Decision: Approved the recommended Alternative 1, reinforced concrete pavement, with high durability concrete (40 HDP), as follows:

300 mm (12 in.)	Reinforced Concrete Pavement (27 ft joint)
300 mm (12 in. To 9 in.)	Reinforced Concrete Shoulder (27 ft joint)
100 mm (4 in.)	Open Graded Drainage Course Geotextile Separator
254 mm (10 in.)	Ex. Sand Subbase - Add Underdrains

ACTION: The Design Division will also investigate allowing the possible use of other concrete typicals based on the findings of the Concrete Pavement Deterioration Study performed by Mark Snyder (MDOT Research Report 90-0973). The approved alternate, along with other possible equivalent concrete typicals, may be shown on the plans. If so, the typical used would be at the contractor's option. The Design Division is to investigate the feasibility of this approach with FHWA.

(Signed Copy on File at M&T)

Calvin Roberts, Secretary
Engineering Operations Committee

Attachment

cc: EOC Members
District Engineers
R. A. Welke
D. L. Coleman
D. L. Smiley
L. E. DeFrain
I. B. Patel
S. Bower

R. J. Risser, Jr. (MCPA)
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